

RETROSPECTIVE STUDY OF SERUM SCLEROSTIN MEASUREMENTS IN BED REST SUBJECTS

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INTRODUCTION

Animal models and human studies suggest that osteocytes regulate the skeleton's response to mechanical unloading at the cellular level in part by an increase in sclerostin, an inhibitor of the anabolic Wnt pathway. However, few studies have reported changes in serum sclerostin in humans exposed to reduced mechanical loading. Thus, we determined changes in serum sclerostin and bone turnover markers in healthy adult men who participated in a controlled bed rest study.

METHODS

Seven healthy adult men (31 ± 3 yrs old) underwent 90-day six-degree head down tilt bed rest at the University of Texas Medical Branch in Galveston's Institute for Translational Sciences - Clinical Research Center (ITS-CRC). Serum sclerostin, PTH, serum markers of bone turnover (bone specific alkaline phosphatase, RANKL/OPG, and osteocalcin), urinary calcium and phosphorus excretion, and 24 hour pooled urinary markers of bone resorption (NTX, DPD, PYD) were evaluated pre-bed rest (BL), bed rest day 28 (BR-28), bed rest day 60 (BR-60), and bed rest day 90 (BR-90). In addition, bone mineral density (BMD) was assessed by dual-energy X-ray absorptiometry (DXA) at BL, BR-60, and post bed rest day 5 (BR+5). Data are reported as mean \pm standard deviation. We used repeated measures ANOVA to compare baseline values to BR-28, BR-60, and BR-90.

RESULTS

Consistent with prior reports, BMD declined significantly (1-2% per month) at weight-bearing skeletal sites (spine, hip, femur neck, and calcaneus). Serum sclerostin levels were elevated above BL at BR-28 ($+29\% \pm 20\%$, $p = 0.003$), BR-60 ($+42\% \pm 31\%$, $p < 0.001$), and BR-90 ($22\% \pm 21\%$, $p = 0.07$). Serum PTH levels were reduced at BR-28 ($-17\% \pm 16\%$, $p = 0.02$), BR-60 ($-24\% \pm 14\%$, $p = 0.03$), and returned to baseline at BR-90 ($-21\% \pm 21\%$, $p = 0.14$). Serum bone turnover markers did not change, however urinary bone resorption markers and calcium were significantly elevated following bed rest ($p < 0.01$).

CONCLUSION

We observed an increase of serum sclerostin associated with decreased serum PTH and elevated bone resorption markers in otherwise healthy men subjected to long-term immobilization.

ACKNOWLEDGEMENTS: We would like to acknowledge support from NASA's Human Research Program (NASA NNX10AE39G), NIH (R21 AR057522, UH2AR059655), Harvard-MIT Division of Health Sciences and Technology (HST) Bioastronautics PhD Program, and Northrop Grumman Aerospace Systems PhD Training Fellowship for providing support for this work. We also thank the NASA Human Research Program, the Human Health and Countermeasures Element, the Flight Analogs Project, Dr. Robert Ploutz-Snyder for advice on the statistical methods, and the staffs at the University of Texas Medical Branch in Galveston's Institute for Translational Sciences - Clinical Research Center.